

INVENTIVENESS AS A DRIVER OF SMALL AND MEDIUM-SIZED BUSINESS PROFITABILITY IN SOUTH AFRICA: A QUANTILE REGRESSION METHOD

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Abstract:

In South Africa, inventiveness is a critical factor of expansion and growth, and small and medium-sized businesses have been designated as tools for achieving the societal and economic objectives and innovation outlined in the National Development Plan. This research examines inventiveness's impact on small-and medium-sized profitability in South Africa. The quantile regression method was utilized in empirical studies to explore the influence of inventiveness on enterprise profitability across different sales stages. The research was based on data from the World Bank's business questionnaire. The results showed that expenses on development and research positively and substantially influenced profitability for businesses using more excellent sales (fast expansion or more giant enterprises). Existing proof demonstrates that incorporating new items and services boosts profitability for businesses with low progress/ tiny businesses. Based on empirical evidence, inventiveness is essential for the growth and development of small and medium-sized businesses. Smaller/low-growth businesses cannot make expenditures on R&D because of a shortage of funds, which could contribute to their low chances of surviving. Considering the significant cash investment needed for R&D expenditures, additional support could be offered to smaller businesses in less powerful sales expansion. Because of a lack of funding for R&D, smaller businesses are being driven to create new items and production procedures that do not require significant financial commitments.

Keywords: Small and medium-sized businesses, Profitability, Fourth Industrial Revolution, Inventiveness and South African

INTRODUCTION

Small and medium-sized businesses (SMBs) are critical for every country's economic expansion and prosperity; maintaining their profitability over time represents a significant problem (Abredu et al., 2023). Because of the evolving character of the international economy, which has grown increasingly centered around knowledge, firms must be creative to continue expanding and evolving while also accomplishing social and economic targets (Lanre-Babalola et al., 2023). The industrial or commercial utilization of anything new or innovative, such as an item, new technique, or technique for manufacturing, is sometimes referred to as inventiveness (Langton & Mafini, 2023). Considering its significance, inventiveness represents a worldwide issue, particularly in South Africa. It is a source of worry, considering the socioeconomic issues many emerging economies confront, especially joblessness, inequalities, and destitution (Gomwe & Boikanyo, 2023).

Small and medium-sized businesses (SMBs) comprise many companies and employment in enormous global economies (Mkhwanazi, 2023). Their capacity for adaptation to technological advances and digitization provides achievement when executed practically and allows them to be successful in global marketplaces (Attayi et al., 2022). Hence, they need to catch up to the economy's significant enterprises. Whenever digitization and inventiveness are involved, this has specific



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adverse effects on the profitability of SMBs (Achola, 2022). SMBs' digital progress necessitates rethinking and innovating their enterprise models; moreover, they need more opportunity and funding to implement novel approaches and imaginative fresh business models (Hisham, 2023). This literature emphasizes the relevance of digital transformation and innovativeness in keeping SMBs growing (Alam et al., 2022). Corporations will only get used to shifting environments if they innovate or digitize.

The arrival of the fourth industrial revolution (4IR) and the COVID-19 epidemic have hastened the demand for SMBs to create new items and digitize (Fan et al., 2023). As a result, monitoring profitability models are expanding beyond conventional operations such as accounting and production to include intangible items such as knowledge and understanding of inventiveness and digitization, especially R&D (Ongo Nkoa & Song, 2023). As a result, it is critical to more accurately evaluate the profitability of SMBs as well as how it connects to the digitization and creative thinking inside SMBs (Margaret Muthoni, 2023). Since the advent of freedom in 1994, South Africa has faced issues that include rising joblessness, income disparity, and poverty rates (Mathebula, 2022). In addition, because of the slow recovery from the 2008/2009 worldwide recession, economic expansion has been weak for the past ten years (Mohamed Abousafi et al., 2023). SMBs have been designated tools for achieving economic and social targets and fostering innovations outlined in the National Development Plan. Small and medium-sized enterprises, on the other hand, remain behind more giant enterprises in terms of impact on GDP and inventiveness (Muriuki, 2023).

South Africa has acknowledged innovativeness as an essential component of progress and growth. As a result, policy frameworks have been devised that motivate the government and the private sector to prioritize innovations (Johannes, 2022). South Africa embraced the National System of Innovativeness (NSI) in 1996, encompassing Undertaking, Utilizing, and Communicating (UUC) as well as Science, Technology, and Innovativeness (STI) to tackle the obstacles to innovativeness that confront businesses of all sizes as well as improve South African technological strengths (Hultman et al., 2022). In 2019, a new white paper on the intersection of science, technology, and innovation was approved in light of the evolving character of the global economy (Liang et al., 2023). Considering these attempts, more than SMB's inventiveness rates are needed to make a difference in SMB's expansion and advancement (Guo, 2023). Dabo (2022) contends that continual innovation is essential for creating an organization's differentiation, which affects its continued existence. According to research conducted by Bushe, more than 70% of SMBs collapse during the first 5-7 years of operation (Steinbrunner, 2023).

In South Africa, empirical research on the influence of inventiveness on company profitability is limited. There is an expanding body of literature on the characteristics of innovation and digitization in South African SMBs, emphasizing the need for more facilities, expertise, and abilities to raise innovative rates. In addition, contemporary research such as Naicker (2023) studies the issues encountered by SMBs and the numerous innovation tactics employed by enterprises. Based on Barney (1991), theories of competitive advantage (which may be used to predict business success) contain those that emphasize internal advantages and disadvantages and external variables, including possibilities and abilities. The former is the perspective on resources, while the following are environmental theories of competitive advantage (Chikosi, 2022). Environmental competitive advantage models presume that enterprises in a sector have similar assets and that any form of diversity is anticipated to be an immediate occurrence (Maharaj, 2022). The perspective on resource theory outlines the internal strengths and assets that differentiate businesses, relaxing the premise of financial comparability (Udeagha & Muchapondwa, 2023). Yang et al. (2023) were the first to develop the notion. Materials are defined as a business's pool of information, equipment, worker

skills, and intangible and tangible properties. Barney et al. (2001) developed a thorough and tangible model focusing on the features of corporate resources necessary to build a long-term competitive advantage. Among the resources mentioned are intangible property, business ownership, professionally focused, differentiated capabilities, and a unique blend of business expertise and people abilities (Udeagha & Muchapondwa, 2023).

The perspective on resources gives an overview of how resources contribute to creating an ongoing competitive advantage through planning and approach design (Goda and Domínguez). Resource-based theory is relevant to this research because inventiveness is a resource organizations utilize to enhance profitability (Yahaya & Nadarajah, 2023). Ingenuity is tied to academic reserves and may also be considered intangible property. Several studies have investigated the influence of innovative technology on company profitability. The research found that technological innovations improve SMBs profitability by increasing employment opportunities. Small firms' successful use of technological innovations also increases their profitability and accessibility to worldwide marketplaces (Kwidini, 2022).

According to the National Development Plan (NDP), SMBs are vital for achieving socioeconomic targets and innovating in South Africa (Endris & Kassegn, 2022). In addition, SMBs are expected to generate 90% of new employment by 2030. Regarding job creation and Gross Domestic Product contributions, South Africa's SMB industry has done poorly compared with comparable nations with middle incomes. Based on Gaglio et al. (2022), SMBs in South Africa account for 56% of total jobs over 45-50% of GDP, contrasted with 95% and 70% in comparable middle-income nations. Booyens et al. (2022) reported that small and medium businesses account for 99% of all companies in the Organisation for Economic Cooperation and Development (OECD) member nations and generate 50 and 60% of the overall added worth. The low success rate of SMMEs in South Africa has been linked to the entrepreneurship atmosphere, particularly needing to be more favorable to company expansion or growth (Bag et al., 2022).

In addition, there needs to be more appropriate inventiveness, frequently caused by difficulty acquiring funds for R&D expenditures (Le et al., 2022b). According to the 2019/2020 Global Entrepreneurship Monitor (GEM) report, the company discontinuation rate was 4.9%, while the long-term company possession rate, which is the proportion of the population over the age of 18 that has controlled or operated firms for more than 42 months, was 3.5% (Centobelli et al., 2021). It indicates that the rate of company failures is higher than the rate of company creation (Rodríguez-González et al., 2022). South Africa was placed 49th out of 54 nations in the GEM's National Entrepreneurship Contextual Index (NECI) in 2019, a ranking that indicates the entrepreneurial atmosphere that supports company startups and expansion (Dey et al., 2022). Recognizing the ongoing issues of access to capital for SMBs, the Minister of Small Business Development announced the establishment of the Small Business Innovative Funds, which would give financial assistance and loans to SMBs with considerable prospects for growth (Le et al., 2022a). One of the Fund's goals is to stimulate SMBs' inventiveness and expansion, which are critical for maintaining their competitive edge (Alghababsheh et al., 2022). The research focused on four sorts of innovativeness: items, procedures, advertising, and organization. The four categories of inventiveness have an excellent and considerable impact on SME revenue success (Czarnitzki, 2023). Hence, the researchers emphasize the importance of the company's strategy in ensuring that item inventiveness, advertising inventiveness, and organizational inventiveness are all linked with expansion.

According to Larprojpaiboon (2017), only innovativeness in technology has a beneficial influence on the achievement of a company in the automobile sector, whereas organizational and advertising inventiveness have minimal impact. Given the high cost of capital in the automobile

sector, technological innovativeness considerably impacts business success (Soumonni, 2017). On the other hand, the minor impact of advertising inventiveness on company profitability could be attributed to the simple fact that the majority of the automobile supplier businesses in the sample lack organizational advertisement departments; thus, advertising inventiveness is not widely recognized by these businesses (Dornbusch & Neuhäusler, 2013). The negligible impact of organizational inventiveness on business profitability is also explicable by the reality that most of the enterprises in the sample were family-controlled and operated and had fewer requirements for reorganization (Hisham, 2023).

Kans Zuhir et al. (2017) discovered that R&D expenditure on inventiveness has an excellent effect on work and export development in South Africa. Birasnav et al. (2011) discovered that the interactions between advertising, environmentally friendly marketing, and innovative advertising positively affect the company's profitability in southern Gauteng, South Africa. These research studies still need to distinguish between businesses based on size. Based on the NDP, SMBs are designated tools for inventiveness in South Africa. As a result, this research adds to the South African literature by studying the impact of inventiveness on improving company success. The quantile regression approach is employed in this research to clarify SMBs based on several sales indicators that may be considered indicators of business expansion. This research addresses this void by researching the impact of inventiveness on SMB's success in South Africa.

METHODS

The research uses data from the World Bank's business questionnaires in 2020. The questionnaire is a collection of data about several aspects of businesses in Gauteng (37.19% of the overall population of 917), the Western Cape, KwaZulu Natal (KZN), and the Eastern Cape. Based on the World Enterprise questionnaire statistics, most businesses (37.19% of the overall population of 917) are in Gauteng, KwaZulu-Natal, the Western Cape, and the Eastern Cape. Considering the province is South Africa's leading economic hub, it is to be anticipated. Because of its large demographics and significant business activity, Gauteng offers additional prospects for SMB expansion and development. Research demonstrates that most SMBs (more than 60%) are small, which can be optimistic considering the more significant efficiency potential of small enterprises compared to medium and more significant businesses. According to Hosseini et al. (2020), nearly all SMBs are in service-related businesses, with 30% in the retail and wholesale market business, 23% in the neighborhood and social development business, and 14% in the financial services sector, making up the majority. It is to be anticipated, considering that the service industry accounts for most of South Africa's production and jobs. This research focuses on South African SMBs. The variables employed in this research are listed in Table 1. Focusing on the existing empirical literature on the factors that influence company profitability, the empirical model is as outlined below:

$$Y_i = a_{1i} + a_{2i}D_{2i}^{innov} + a_{3i}D_{3i}^{reg} + a_{4i}D_{4i}^{prof} + a_{5i}D_{5i}^{cri} + a_{6i}HC_i + a_{7i}MS_i + a_{8i}Age + \varepsilon_i$$

Where y_i is a determination of company profitability, D_{2i}^{innov} is a dummy factor for inventiveness that is captivated by R&D expenditures and new items. HC represents human capital, MS represents market share, and ε represent the error term. According to Oforegbunam and Okorafor (2010), business profitability factors are total sales and efficiency (sales per employee). These factors are expressed in the logarithmic form to account for the unequal distribution caused by size disparities. R&D expenditures and the release of new items are examples of inventiveness techniques. R&D expenditures relate to the release of new items that improve business profitability.



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Rajesh and Mahesh Babu (2018) utilize the level of R&D as a metric for inventiveness because they see research expenditures as a way to improve the competitiveness of a business's items. Launching new items is a sign of item innovativeness, which is a critical factor in the company's profitability (Bercu, 2012). Kawamura (2011) also examined inventiveness and job growth using product innovativeness. The release of new or upgraded items was classified as inventiveness in items. The control variables are chosen by considering their relationship to company profitability. The availability of financing is predicted to boost business profitability by incentivizing development (Alnachef & Alhajjar, 2017).

Table 1. Summary of Variables

Variables	Summary
R&D expenditures	A dummy variable that indicates a business that contributed to R&D in the fiscal year prior and 0 normally
Area	dummy variable where 1 reflects a business in Gauteng as well as 0 normally
New items	dummy variable where 1 reflects a business that recently released a new item as well and 0 normally
Age	The number of years when the company was founded
Human capital	The proportion of employees that have finished secondary school
Market share	The company's market share
Total revenue	Total revenue for the previous fiscal year
Efficiency	Worker revenue per hour
Criminal activity	The dummy variable indicates that the company that reported a criminal act impeded its business activities, and 0 on the contrary.
Financial management	The dummy variable indicates a company that reported that the availability of financing was a barrier and 0 for no reason.

Market share is believed to have a beneficial influence on a company's sales and profitability. By enhancing worker efficiency, human capital is intended to boost business profitability (Gu & Luo, 2022). To a certain degree, the influence of age on business profitability is equivocal. According to Aliane and Berrouche (2021), aging has a detrimental impact on company profitability. Hence, it has been demonstrated that the probability of survival of newer small and medium-sized in South Africa is relatively low, implying that older businesses are more appreciated. Crime raises protection expenses and may result in damage to assets or technology theft, which harms the company's profitability. Quantile regression is used to calculate Equation (1).

Jaiswal and Sharma (2023) claimed that quantile regression differs from standard linear regression because the goal is to determine the conditional mean function by minimizing the sum of squared residuals. It is based on minimizing the sum of unevenly scaled relative residuals to estimate conditionally median distributions. The traditional least-squares method predicts the average influence of the explanatory variable on the dependent variable but may be inadequate because of the exclusion of essential data (Al Qershi et al., 2021). In addition, the typical least-squares approach is predicated on the presumption of residual normality that is broken in certain situations. The mean regression method depends on the Gaussian assumption, which states that mistakes in a regression model are a collection of tiny, independently dispersed errors. Regression models using heavy-tailed distributions are prevalent. The presumption of uniformly and separately dispersed errors is relaxed in quantile regression, thereby estimating values for various points on a distribution (Iqbal et al., 2023). Stretching the assumption acknowledges the variability in the businesses chosen for this analysis; the influence of inventiveness on company profitability may depend on firm size



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and growth. Castrogiovanni (2011) emphasizes that the impact of R&D intensity is substantial for more giant enterprises than lesser businesses; hence, an approach that accounts for disparities in company growth is required. Quantile regression is resistant to heavy-tailed distributions and heteroscedasticity, including outliers. As a result, it is the best estimation approach for this research. A quantile regression model may be defined in the following manner:

$$y_i = x_i a_p + u p_i$$

When y_i represents the dependent variable, x_i represents the vectors of explanatory variables, a represents a vector of estimations of coefficients connected with the p th quantile for each $p \in (0, 1)$ as well as u represents vectors of errors. The p th quantile is determined by reducing the proportional unconditional remaining in the following manner:

$$\min \sum_{a^b} \sum_{t \in \{t: y_i \geq x_i a\}} P|y_i - x_i a| + \sum_{t \in \{t: y_i \geq x_i a\}} (1 - p)|y_i - x_i a|$$

RESULT AND DISCUSSION

Table 2 displays descriptive statistics. Distributions of frequencies and percentages were shown using binary and dummy variables. The variables will be expressed logarithmic because revenue and efficiency have relatively high standard deviations. The average market share of SMBs is little more than 11%, indicating the market access issues still affecting small- and medium-sized businesses. The average age of SMBs is over 24 years old, with 67% of workers finishing secondary school across all SMBs. Over half of SMBs cited difficulties with accessibility to finance and criminality. As previously stated, Gauteng province is home to over 37% of SMBs. According to the inventiveness dummy variables, only a few enterprises engage in innovative endeavors. About 4% of small and medium-sized businesses produce new items, while only 25% have invested in R&D investments (Mathur & Arora, 2022). The empirical approach entails regressing the logarithm of revenue and sales per employee (efficiency) on the variables of innovation and control. Tables 2-5 demonstrate the results of quantile regressions for the 25th, 50th, and 75th percentiles.

Table 3 demonstrates that for enterprises in the 50th and 75th percentiles, inventiveness has a positive influence on revenues. Guo (2023) discovered data that confirmed the assumption that R&D investment enhances business profitability, which supports the positive coefficient. According to Dabo (2022), R&D expenditure adds to business success by providing a competitive edge. In addition, R&D expenditures allow a company to develop and offer new technology or business approaches, which increases revenue and profits. The data reflect Steinbrunner's (2023) conclusions that R&D expenditures are substantial for enterprises with more significant revenues. Naicker (2023) discovered that rapidly expanding small enterprises contributed more to inventiveness and the creation of an overall boost to the economy than slow-growing organizations.

Table 2. Descriptive Statistics

Variable	Mean	Std. Dev
Revenue	1.65e + 07	6.59e + 07
Market share	11.1603	24.75305
Human capital	67.2790	27.9349



Efficiency	831845.60	6831829
Age	24.0869	18.5224

Dummy Variables

Variable	Frequency	Percent
Finance	524 (393)	57.14(42.86)
Crime	488 (429)	53.22(46.78)
New items	36 (881)	3.93(96.07)
R & D pending	232 (685)	25.30(74.70)
Area	341 (576)	37.19(62.81)

According to Yang et al. (2023), R&D intensity positively and significantly impacts job growth for enterprises in the medium and higher quartiles of (0.4-0.9). Chikosi (2022) discovered that inventiveness is positively associated with company profitability using trademarks and R&D investment as metrics of inventiveness for rapidly expanding organizations. However, the average impact coefficient is modest and inconsequential. According to Maharaj (2022), businesses in the top quartile do better than those in the lower quartile regarding inventiveness. Consequently, the findings of the present study are more consistent with those presented by Udeagha and Muchapondwa (2023). The findings contrast those of Yahaya and Nadarajah (2023), who discovered that R&D expenditures significantly impact enterprises with smaller revenues. The debut of a new item boosts profitability for enterprises with smaller revenue, as seen in Table 3.

Table 3. New Items and Revenues

Variable	Revenues (25 th)	Revenues (50 th)	Revenues (75 th)
Finance	0.1944 (0.9649)	0.4812** (2.5312)	0.9722*** (4.3491)
Crime	-0.0104(-0.0556)	0.0664 (0.3777)	0.1505 (0.7282)
R & D expenditures	-0.099(-0.5485)	0.6483*** (3.8053)	0.5567*** (2.7788)
Area	1.2561*** (8.6737)	1.0393*** (7.6055)	0.7747*** (4.8211)
Human capital	0.0031 (1.313)	0.0073*** (3.3074)	0.0116*** (4.459)
Age	0.0001 (0.2323)	0.0005 (1.3218)	0.00001 (0.102)
Market share	0.0093*** (3.4448)	0.012*** (4.7015)	0.0099*** (3.2875)
Constant	12.9293*** (58.1248)	13.477*** (64.2058)	14.1333*** (57.2585)

Note(s): *t*-statistics are in parenthesis. ** and *** represent significance at the 5% and 1% levels, respectively

Table 4. R&D New and Revenues

Variable	Revenues (25 th)	Revenues (50 th)	Revenues (75 th)
Finance	0.1772 (0.9658)	0.0827 (0.4146)	0.6148*** (2.9359)
Crime	0.0458 (0.2549)	0.0596 (0.3054)	0.784* (1.9491)
New item	0.8906** (2.5265)	0.0884 (0.2307)	0.1295 (0.63319)
Area	1.2927*** (9.2791)	1.031*** (6.8051)	0.773*** (4.8622)
Human capital	0.0033 (1.4731)	0.0082*** (3.3366)	0.0117*** (4.5554)
Age	0.00001 (-0.1386)	0.0003 (0.7983)	0.0002 (-0.5656)
Market share	0.0094*** (3.6369)	0.0089*** (3.1578)	0.0083*** (2.8151)
Constant	12.837*** (66.9915)	13.7481*** (65.9771)	14.4819*** (66.2269)

Note(s): *t*-statistics are in parenthesis. *, ** and *** indicate significance at the 10, 5 and 1% levels, respectively

Table 5. R&D Expenditures and Efficiency

Variable	Effic (25 th)	Effic (50 th)	Effic (75 th)
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Finance	0.3477** (1.9937)	0.4918*** (2.6339)	0.4378** (2.3971)
Crime	0.0024 (0.0148)	0.2446 (1.4168)	0.1092 (0.6463)
R & D expenditures	0.193 (1.2347)	0.3833** (2.2908)	0.5571*** (3.4037)
Area	1.036*** (8.2644)	0.7182*** (5.3507)	0.4539*** (3.4577)
Human capital	0.0073*** (3.5845)	0.0081*** (3.6997)	0.0073*** (3.4044)
Age	0.0005 (1.5581)	0.0005 (1.5366)	0.0001 (0.4384)
Market share	0.0058** (2.4563)	0.0068*** (2.7192)	0.0067*** (2.7223)
Constant	10.0465*** (52.1741)	11.0676*** (53.6845)	12.0264*** (59.6387)

Note(s): *t*-statistics are in parenthesis. ** and *** indicate significance at the 5 and 1% levels, respectively

For enterprises in the 50th and 75th quantiles, new item creations are minimal at the 5% level. This research backs up the results of Abbas et al. (2022), who found that small businesses have more excellent rates of inventiveness as assessed by the launch of new items and procedures inventiveness. Kwidini (2022) discovered that revenue generated from new items positively affected company profitability (work development) for enterprises at the bottom of the range. Yi et al. (2022) discovered that new items' product inventiveness is inversely associated with company profitability for businesses with less revenue (lower portion of the distributed). This data implies that for smaller enterprises in South Africa, inventiveness motivated by the launch of new items is a significant factor in company success.

In the 50th and 75th quantiles, obtaining financing positively and substantially influences business profitability. Accessibility to financing is a crucial factor in technology investments, encouraging revenue (Frimpong, 2022). Based on the study's results, accessibility to credit boosts business profitability for those with more significant revenues. Accessibility to capital is not crucial in positive revenues for smaller businesses. Crime has a negative but little impact on business profitability. Gauteng-based SMBs are projected to fare much better than those in other provinces, as forecast. Gauteng has additional commercial potential because of its higher population and presumably a more significant number of competent people. This research implies that business activity significantly influences small and medium-sized success.

Because of greater possibilities for SMBs, growing economic activity provides additional opportunities for revenue expansion and efficiency. A positive and significant market share coefficient confirms this conclusion. Accessibility to marketplaces is one of the primary impediments to the expansion and expansion of SMBs, owing to larger enterprises' power and significant joblessness, as well as the South African economic system's weak profitability (Chen et al., 2023). Human capital is associated with company profitability in the 50th and 75th percentiles, consistent with theoretical predictions. As organizations expand in size, the level of detail of the products and services that need them supply advances, necessitating more significant amounts of human capital than those of lesser size. Workers with more excellent education are believed to be more efficient and inventive, which improves business success. Gao et al. (2023) discovered that human capital is critical for the profitability of SMBs in South Africa. Chang et al. (2023) emphasized the importance of human capital in company success as economies grew increasingly based on expertise. Age has little influence on the success of SMBs. Revenue per worker (efficiency) is employed as a metric of company profitability for robustness considerations. According to Tables 5 and 6 findings, R&D expenditures are only substantial for enterprises with more significant revenues. The debut of new items has little impact on revenues per employee for all enterprises (but is marginally significant for companies with lower revenues).

Table 6. New Items and Efficiency



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Variable	Effic (25 th)	Effic (50 th)	Effic (75 th)
Finance	0.3187** (1.9819)	0.3561* (1.8414)	0.2603 (1.2968)
Crime	-0.0236 (-0.1499)	-0.3213* (-1.6978)	-0.237 (-1.2065)
New items	0.5299* (1.7154)	0.2545 (0.6849)	-0.0405 (-0.1051)
Area	1.0043*** (8.2254)	0.7682*** (5.231)	0.3793** (2.4888)
Human capital	0.0078*** (3.9599)	0.0089*** (3.735)	0.0058** (2.3334)
Age	-0.0005* (-1.7316)	-0.0005 (1.2393)	0.0001 (0.1561)
Market share	0.0051** (2.2615)	0.0045* (1.6611)	0.0039 (1.3685)
Constant	10.1039*** (60.164)	11.2143*** (55.5213)	12.5024*** (59.6389)

Note(s): *t*-statistics are in parenthesis. *, ** and *** indicate significance at the 10, 5 and 1% levels, respectively

The insignificance might be because very few companies launch new items. It should still be observed that the robustness findings are comparable to those of the significant regressions. According to the NDP, SMBs are vital for achieving economic objectives and innovating in South Africa. In addition, SMBs are expected to generate 90% of new employment by 2030. The research results emphasize the significance of inventiveness for business profitability, which has a variety of policy possibilities. In the words of Guo et al. (2022), more than 70% of SMBs fail during the first 5-7 years of existence. Poor inventiveness, which impedes business profitability and development, may be to blame for SMBs' declining survival rate. Based on Addi Muqit (2022), SMB sustainability requires inventiveness, mainly through economic downturns. As a result, SMB expansion and growth and their potential for generating jobs outlined in the NDP depend on inventiveness. Accessibility to finance for R&D expenditures and developing new items is critical. According to the findings, R&D expenditures favor and substantially influence revenue and efficiency for businesses with higher revenue (rapid development or more giant enterprises).

On the other hand, the debut of new items has a beneficial influence on company profitability only for businesses with less revenue (poor development or smaller enterprises). The results show that smaller businesses want to innovate and create new items. Despite this, they may need more financial resources to make the investments required. The data further indicates that bigger businesses' R&D expenditures hardly contribute to the launch of new items, provided that the inventiveness of new items has a negligible influence on company profitability. R&D investments concentrate on fields that enhance manufacturing procedures or upgrade existing items. The results of the research have ramifications for future studies. The results show that the influence of business innovativeness on business success is proportional to how much revenue it generates. As a result, future research on SMB profitability, in particular, should differentiate enterprises based on size or number of revenues to account for the constraints businesses encounter at various phases. Future studies might additionally concentrate on the obstacles that minor enterprises experience when attempting to invest in R&D. Accessibility to finance has been a great difficulty for SMB shareholders, particularly those with low socioeconomic status, as Cai (2023) mentions.

CONCLUSION

This research examined inventiveness's impact on SMB profitability in South Africa. R&D expenditures and the release of new items have been selected as inventiveness variables for the investigation. Total revenue and revenue per employee were used to assess business success. The empirical research was based on the World Bank's 2020 business questionnaire. Because of its flexibility in determining values of coefficients at multiple points of transportation, quantile regression analysis was selected as the approach for generating a regression model. The empirical analysis revealed that R&D expenditures had a favorable and significant impact on profitability for



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enterprises with higher revenue stages, independent of the measure. R & D expenditures are limited to larger organizations, implying that smaller enterprises lack the money to undertake such expenditures. The results have repercussions for policy in South Africa.

The research recommends that policymakers establish an atmosphere that encourages R&D expenditures and the development of innovative items. Inventiveness is critical to the profitability of South African SMBs, which are tasked with driving growth in efficiency, job creation, GDP, and the attainment of social and economic targets that include inequality and low incomes. The government has implemented initiatives like R&D tax breaks and firm-specific inventiveness programs. Hence, such rules benefit bigger businesses or businesses with higher earnings. In addition, the OECD (2021) believes South Africa continues to lag below other OECD nations regarding R&D assistance to enterprises. Considering the substantial cash investment necessary for R&D expenditures, more assistance should be offered to smaller enterprises with weaker revenue growth.

REFERENCES

Abbas, M. G., Wang, Z., Ullah, H., Mohsin, M., Abbas, H. & Mahmood, M. R. (2022). Do Entrepreneurial Orientation and Intellectual Capital Influence SMEs' Growth? Evidence from Pakistan. *Environmental Science and Pollution Research*, pp. 1-16. <https://doi.org/10.1007/s11356-021-17542-y>

Abredu, P., Li, C., Essien, F. K. & Adegoke, I. A. A. (2023). Unleashing Potential: Overcoming Bottlenecks and Catalyzing Innovations in Intellectual Capital Intellectualization of Small and Medium-Sized Enterprises in Jiangsu During the Post-Industrial Era. *SAGE Open*, 13. <https://doi.org/10.1177/21582440231202086>

Achola, C. A. (2022). Determinants of Growth of Small and Medium Manufacturing Enterprises Within Industrial Area, Nairobi County.

Addi Muqit, A. M. (2022). Predicting Employees' Happiness and Innovativeness Through the Lens Of Internal CSR Practices. UTAR.

Alam, A., Du, A. M., Rahman, M., Yazdifar, H. & Abbasi, K. (2022). SMEs Respond to Climate Change: Evidence from Developing Countries. *Technological Forecasting and Social Change*, 185. <https://doi.org/10.1016/j.techfore.2022.122087>

Alghababsheh, M., Butt, A. S. & Moktadir, M. A. (2022). Business Strategy, Green Supply Chain Management Practices, and Financial Performance: A Nuanced Empirical Examination. *Journal of Cleaner Production*, 380. <https://doi.org/10.1016/j.jclepro.2022.134865>

Aliane, S. & Berrouche, Z. (2021). Entrepreneurs' Personnel Characteristics and Their Impact on the Growth of SMEs. *Al Bashaer Economic Journal*, 7. <https://doi.org/10.33704/1748-007-002-059>

Alnachef, T. H. & Alhajjar, A. A. (2017). Effect of Human Capital on Organizational Performance: A Literature Review. *International Journal of Science and Research*, 6, 1154-1158.

Al Qershi, N., Mokhtar, S. S. M. & Abas, Z. (2021). The Relationship Between Strategic Innovations, Human Capital and Performance: An Empirical Investigation. *Sustainable Futures*, 3. <https://doi.org/10.1016/j.sfr.2021.100056>

Attayi, I. F., Emmanuel, I. E. & Oluwayemisi, L.-O. 2022. Cash Management Strategies and SMEs Sustainable Growth in Nigeria. *FLW-International Journal of Management and Social Sciences*, 7, 15-15.



Bag, S., Dhamija, P., Bryde, D. J. & Singh, R. K. (2022). Effect of Eco-Innovation on Green Supply Chain Management, Circular Economy Capability, and Performance of Small and Medium Enterprises. *Journal of Business Research*, 141, 60-72. <https://doi.org/10.1016/j.jbusres.2021.12.011>

Bercu, A. M. (2012). The Impact of Human Resource Management Practices on SME Performance in Romania. *Anale. Seria Științe Economice. Timișoara*, 18, 377-384.

Birasnav, M., Rangnekar, S. & Razzaque, A. (2011). The Impact of Organizational Investments on Human Capital Creation: An Empirical Study. *The International Journal of the Computer, the Internet, and Management*, 19, 21.1-21.12.

Booyens, I., Rogerson, C. M., Rogerson, J. M. & Baum, T. (2022). Covid-19 Crisis Management Responses of Small Tourism Firms in South Africa. *Tourism Review International*, 26, 121-137. <https://doi.org/10.3727/154427221X16245632411872>

Cai, L. (2023). Macroeconomic Determinants and Their Impact on Environmental Sustainability: The Role of Cultural and Creative Product Prices. *Environmental Science and Pollution Research*, pp. 1-17. <https://doi.org/10.1007/s11356-023-27425-z>

Castrogiovanni, G. J. (2011). The Role of Human Capital Factors in Small Business Performance and Success. *Human Resource Management in Small Business*, 71-92. <https://doi.org/10.4337/9780857933195.00010>

Centobelli, P., Cerchione, R., Esposito, E. & Passaro, R. (2021). Determinants of The Transition Towards Circular Economy in SMEs: A Sustainable Supply Chain Management Perspective. *International Journal of Production Economics*, 242. <https://doi.org/10.1016/j.ijpe.2021.108297>

Chang, J., Li, B., Chen, B., Shen, Y., Lv, X. & Liu, J. (2023). Does Higher Education Promote Sustainable Development? Role of Green Technology and Financial Performance. *Environmental Science and Pollution Research*, 30, 94890-94903. <https://doi.org/10.1007/s11356-023-28927-6>

Chen, W., Tao, C., Zou, W., Chen, S., Cifuentes-Faura, J. & Qi, Y. (2023). Can Financial Efficiency and Environmental Regulation Promote R&D Innovation? From the Perspective of Value Chain Decomposition. *Environmental Science and Pollution Research*, 30, 58588-58602. <https://doi.org/10.1007/s11356-023-26460-0>

Chikosi, L. C. (2022). The Impact of Corporate Governance on Occupational Risks in South Africa's Mining Industry.

Czarnitzki, D. (2023). Guidebook for Conducting Counterfactual Impact Evaluations of State Aid Schemes for Research Development and Innovation. JRC EXTERNAL STUDY REPORT, 1-46.

Dabo, S. A. (2022). Role of Entrepreneurial Characteristics of Micro and Small Enterprise Owners in Poverty Reduction in Nigeria. *Role of Entrepreneurial Characteristics of Micro and Small Enterprise Owners*.

Dey, P. K., Malesios, C., De, D., Budhwar, P., Chowdhury, S. & Cheffi, W. (2022). Circular Economy to Enhance Sustainability of Small and Medium-Sized Enterprises. *Supply Chain Sustainability in Small and Medium-Sized Enterprises*. Routledge. <https://doi.org/10.4324/9781003018551-2>

Dingiswayo, U., Sibanda, K., & Dubihlela, D. (2023). Unveiling the Green Impact: Exploring the Nexus Between Trade Openness and Environmental Quality in South Africa. *International Journal of Environmental, Sustainability, and Social Science*, 4(5), 1302-1320. <https://doi.org/10.38142/ijesss.v4i5.714>



Dornbusch, F. & Neuhäusler, P. (2013). Academic Knowledge as a Driver for Technological Innovation? Comparing Universities, Small and Large Firms in Knowledge Production and Dissemination. *Fraunhofer ISI Discussion Papers-Innovation Systems and Policy Analysis*.

Endris, E. & Kassegn, A. (2022). The Role of Micro, Small and Medium Enterprises (MSMEs) to the Sustainable Development of Sub-Saharan Africa and its Challenges: A Systematic Review of Evidence from Ethiopia. *Journal of Innovation and Entrepreneurship*, 11, 20. <https://doi.org/10.1186/s13731-022-00221-8>

Fan, W., Anser, M. K., Nasir, M. H. & Nazar, R. (2023). Uncertainty in Firm Innovation Scheme and Impact of Green Fiscal Policy; Economic Recovery of Chinese Firms in the Post-Covid-19 Era. *Economic Analysis and Policy*, 78, 1424-1439. <https://doi.org/10.1016/j.eap.2023.04.002>

Frimpong, S. E. (2022). Financial Literacy, Access to Digital Finance and Performance of SMEs in Selected Commercial Areas in The Central Region of Ghana. University of Cape Coast. <https://doi.org/10.1080/23322039.2022.2121356>

Gaglio, C., Kraemer-Mbula, E. & Lorenz, E. (2022). The Effects of Digital Transformation on Innovation and Productivity: Firm-Level Evidence of South African Manufacturing Micro and Small Enterprises. *Technological Forecasting and Social Change*, 182, 121785. <https://doi.org/10.1016/j.techfore.2022.121785>

Gao, H., Hsu, P.-H. & Wang, Y. (2023). Secondary Stock Exchanges and Growth of High-Tech Entrepreneurs. Available at SSRN. <https://doi.org/10.2139/ssrn.4470564>

Goda, T. & Domínguez, C. L. The effect of dividend payouts on firm-level R&D.

Gomwe, G. & Boikanyo, D. H. (2023). Innovation and Intellectual Capital Competency Factors Influencing SMEs Competitive Advantage in South Africa. A Conceptual Framework. *Expert Journal of Business and Management*, p. 11.

Gu, Y. & Luo, X. (2022). Understanding the Strategic Human Resource Management and Firm Performance: What Knowledge Can We Gain about Small and Medium-Sized Businesses? 2022 7th International Conference on Financial Innovation and Economic Development (ICFIED 2022), 2022. Atlantis Press, 2606-2609. <https://doi.org/10.2991/aebmr.k.220307.424>

Guo, Y., Fan, L. & Yuan, X. (2022). Market Competition, Financialization, and Green Innovation: Evidence from China's Manufacturing Industries. *Frontiers in Environmental Science*, p. 185. <https://doi.org/10.3389/fenvs.2022.836019>

Hisham, S. A. H. S. (2023). Impact of Technology Adoption as a Key Growth Contributor for Women Micro Businesses in Malaysia. University of Wales Trinity Saint David.

Hosseini, S., Nikkhah, Y. & Karami, A. (2020). The Impact of Human Capital Development on the Financial Performance of Small and Medium Businesses through Innovation and Operational Performance. *Journal of Economic & Developmental Sociology*, 9, 93-114.

Hultman, M., Boso, N., Yeboah-Banin, A. A., Hodgkinson, I., Souchon, A. L., Nemkova, E., Oliveira, J. & Hughes, P. (2022). How Agency and Self-Efficacy Moderate the Effects of Strategic Improvisational Behaviors on Sales Performance: Evidence from an Emerging Market. *European Management Review*, pp. 19, 417-435. <https://doi.org/10.1111/emre.12535>

Iqbal, M., Mawardi, M. K., Sanawiri, B., Alfisyahr, R. & Syarifah, I. (2023). Strategic Orientation and its Role in Linking Human Capital with the Performance of Small and Medium Enterprises in Indonesia. *Journal of Research in Marketing and Entrepreneurship*. <https://doi.org/10.1108/JRME-11-2021-0150>



Jaiswal, K. & Sharma, N. (2023). The Measurement and Effect of Human Resource Management in High-Technology Firms. *Management Journal for Advanced Research*, 3, 30-34.

Johannes, M. (2022). Capital Structure and Profitability of State-Owned Enterprises in Namibia.

Kawamura, Y. (2011). The Role of Human and Social Capital on Small Enterprise Growth: Evidence from Sri Lanka.

Kwidini, T. (2022). The Moderating Role of Technological Turbulence on Entrepreneurial Orientation and Organisational Ambidexterity. University of Pretoria (South Africa).

Langton, I. & Mafini, C. (2023). Small and Medium Business Transformational Leadership and Supply Chain Management. *Journal for Transdisciplinary Research in Southern Africa*, 19, 1-11. <https://doi.org/10.4102/td.v19i1.1347>

Lanre-Babalola, F. O., Ajose, O. A., Tongo, N. I., Omoyele, O. S. & Aderemi, T. A. (2023). Human Capital Development and Small-Medium Scale Enterprises Growth: A Critical Appraisal of Empirical Studies. *EuroEconomica*, 42, 183-190.

Larprojpaiboon, M. (2017). The Factors Affecting the Performance of Small and Medium Manufacturing Enterprises in Thailand.

Le, T. T., Behl, A. & Pereira, V. (2022a). Establishing Linkages Between Circular Economy Practices and Sustainable Performance: The Moderating Role of Circular Economy Entrepreneurship. *Management Decision*. <https://doi.org/10.1108/MD-02-2022-0150>

Le, T. T., Vo, X. V. & Venkatesh, V. (2022b). Role of Green Innovation and Supply Chain Management in Driving Sustainable Corporate Performance. *Journal of Cleaner Production*, 374, 133875. <https://doi.org/10.1016/j.jclepro.2022.133875>

Liang, S., Wang, P., Jia, C. & Zhu, J. (2023). Studying Green Financing, Factor Allocation Efficiency, and Regional Productivity Growth in Renewable Energy Industries. *Renewable Energy*. <https://doi.org/10.1016/j.renene.2023.05.072>

Maharaj, R. (2022). The Relevance of a Purpose-Driven Strategy in Enabling FMCG Companies to Sustain Long-Term Customer Loyalty and Optimal Financial Performance: A South African Perspective. University of Pretoria (South Africa).

Margaret Muthoni, M. (2023). Determinants of Women Participation in Entrepreneurial Activities in Murang'a County, Kenya. KeMU.

Mathebula, M. (2022). Intrapreneurship Championing, A Moderator Between Employee Entrepreneurial Orientation and Firm Performance in SMEs. University of Pretoria (South Africa).

Mathur, V. & Arora, S. (2022). Analyzing the Impact of Human Capital on the Sustainable Growth and Development of Small and Medium Enterprises (SMEs): An Empirical Study. <https://doi.org/10.34293/commerce.v10i2.4654>

Mkhwanazi, N. (2023). An Investigation of Invotech Business Incubation Programme and its Effect on Entrepreneurs.

Mohamed Abousafi, E. M., Ali, M. A. & Iparraguirre, J. L. (2023). Industrial Clusters and the Five Drivers of Regional Productivity in Egypt. *Industry Clusters and Innovation in the Arab World: Challenges and Opportunities*. Emerald Publishing Limited. <https://doi.org/10.1108/978-1-80262-871-520231008>

Muriuki, N. (2023). Influence of Marketing Strategies and Stakeholder's Engagement on Sales Growth of Coffee Export In Kenya. KeMU.



This open-access article is distributed under a Creative Commons Attribution (CC-BY-NC) 4.0 license

Naicker, R. (2023). The Validation of a Big Data Analytics Capability Scale for the South African Context.

Nzuza, Z. W., & Msomi, T. S. (2023). The Relationship Between Macroeconomic Factors and Profitability of Reinsurance Companies in Africa: An Application of System GMM-Model. *International Journal of Environmental, Sustainability, and Social Science*, 4(5), 1334-1344. <https://doi.org/10.38142/ijesss.v4i5.768>

Oforegbunam, T. E. & Okorafor, G. (2010). Effects of Human Capital Development on the Performance of Small & Medium Scaled Enterprises in the Southeastern Region of Nigeria. *Journal of Sustainable Development in Africa*, 12, 49-58.

Ondo Nkoa, B. E. & Song, J. S. (2023). How does digital innovation affect women's entrepreneurship in Africa? An analysis of transmission channels. *The International Journal of Entrepreneurship and Innovation*. <https://doi.org/10.1177/14657503231162288>

Rajesh, M. & Mahesh Babu, T. (2018). Human Capital Growth and its Significance on Organisation Performance: Facts from Developmental Economics.

Rodríguez-González, R. M., Maldonado-Guzman, G., Madrid-Guijarro, A. & Garza-Reyes, J. A. (2022). Does Circular Economy Affect Financial Performance? The Mediating Role of Sustainable Supply Chain Management in the Automotive Industry. *Journal of Cleaner Production*, 379, 134670. <https://doi.org/10.1177/14657503231162288>

Soumonni, D. (2017). Determinants of The Performance of Construction SMES In South Africa.

Steinbrunner, P. R. (2023). May It Be a Little Bit More of Market Power? On Productivity Growth and Competition. *Journal of Industry, Competition and Trade*, 1-48. <https://doi.org/10.1007/s10842-023-00399-x>

Udeagha, M. C. & Muchapondwa, E. (2023). Green Finance, Fintech, and Environmental Sustainability: Fresh Policy Insights from the BRICS Nations. *International Journal of Sustainable Development & World Ecology*, pp. 1-17. <https://doi.org/10.1080/13504509.2023.2183526>

Yahaya, H. D. & Nadarajah, G. (2023). Determining Key Factors Influencing Smes' Performance: A Systematic Literature Review And Experts' Verification. *Cogent Business & Management*, 10. <https://doi.org/10.1080/23311975.2023.2251195>

Yang, F., Ye, X., Huang, W. & Zhao, X. (2023). The Impacts on Informal Financing Strategy of Small and Micro Enterprises by Interest Rate Risks and Public Health Emergencies. *International Entrepreneurship and Management Journal*, pp. 1-33. <https://doi.org/10.1007/s11365-023-00872-3>

Yi, X., Tanveer, A., Bin, L. & Xue, Y. (2022). Unleashing the Influence of Information Sharing, Technological Openness, and Corporate Innovation on Green Corporate Social Responsibility: A Way Toward Environmental Sustainability. *Energy & Environment*. <https://doi.org/10.1177/0958305X221129225>

Zuhir, N. N., Surin, E. F. M. & Rahim, H. L. (2017). A Conceptual Framework of Human Capital, Self-Efficacy and Firm Performance Among SMEs in Malaysia. *International Academy Research Journal of Social Science*, 3, 10-16.